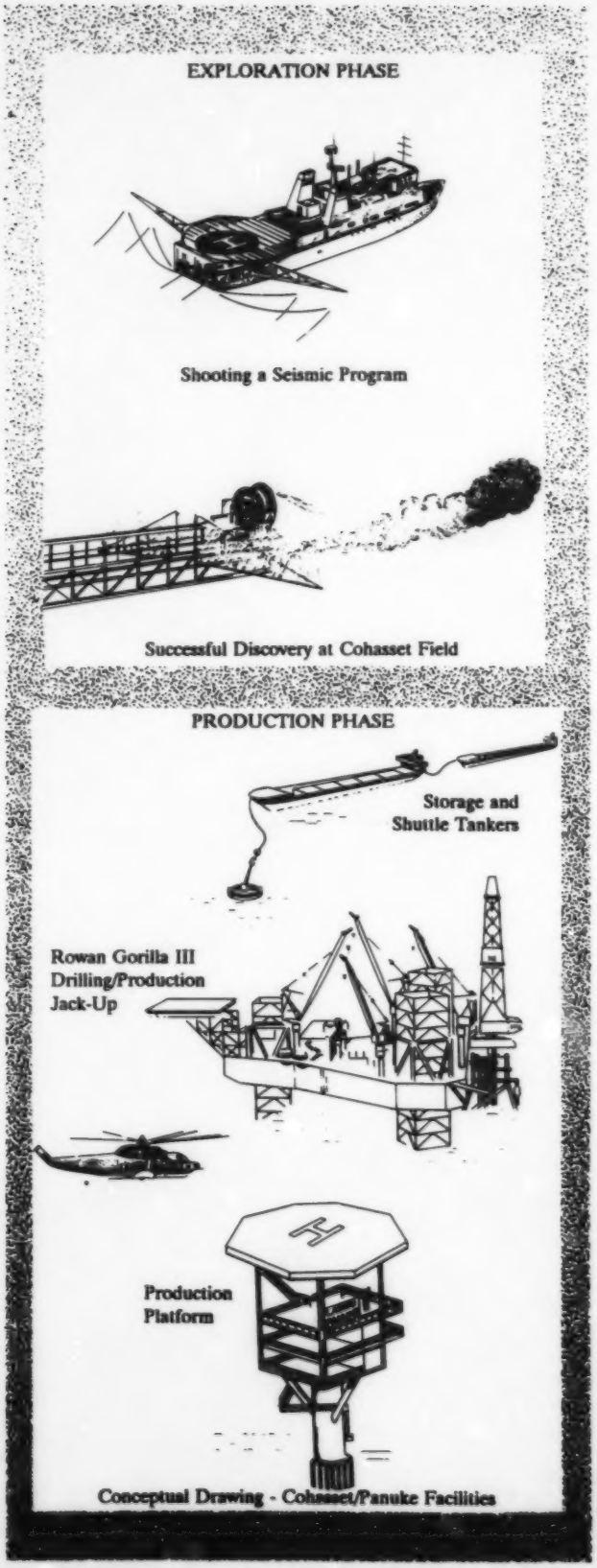


The Cohasset Project

Introduction

The Cohasset project is Canada's first offshore oil project. Production from Cohasset makes Nova Scotia Canada's newest oil-producing province. The six year project will produce up to 49 million barrels of light, high quality oil from two small offshore fields called Cohasset and Panuke. These fields are some 8 kilometres apart and are located about 250 kilometres southeast of Halifax and 40 kilometres southwest of Sable Island (See Figure 1). The project's operator, LASMO Nova Scotia Ltd., and the provincial Crown Corporation, Nova Scotia Resources Limited, are equal partners in the project. The capital costs of the project are estimated to be about $356 million (1992 dollars). The discovery of additional fields in the future would, of course, extend the project's life.

Figure 2 shows that each field will have its own production platform. The oil will be processed using equipment located on a jack-up drilling rig, specially modified to also serve as a production facility for this project. There, the oil is separated from underground water and a small amount of natural gas which is produced with it, pumped to a moored storage tanker and finally transferred and shipped to market by way of a "shuttle" tanker. During winter storms, loading and unloading of the oil is precluded and production ceases. For this reason, in 1992 oil will just be produced during a June to November "production season". In future, LASMO may decide to request permission to produce year-round if it is felt that the volume of oil which can be produced in the winter months makes winter operations worthwhile.

This first offshore project has already provided, and will continue to provide, benefits to Nova Scotia's economy through the purchase of Nova

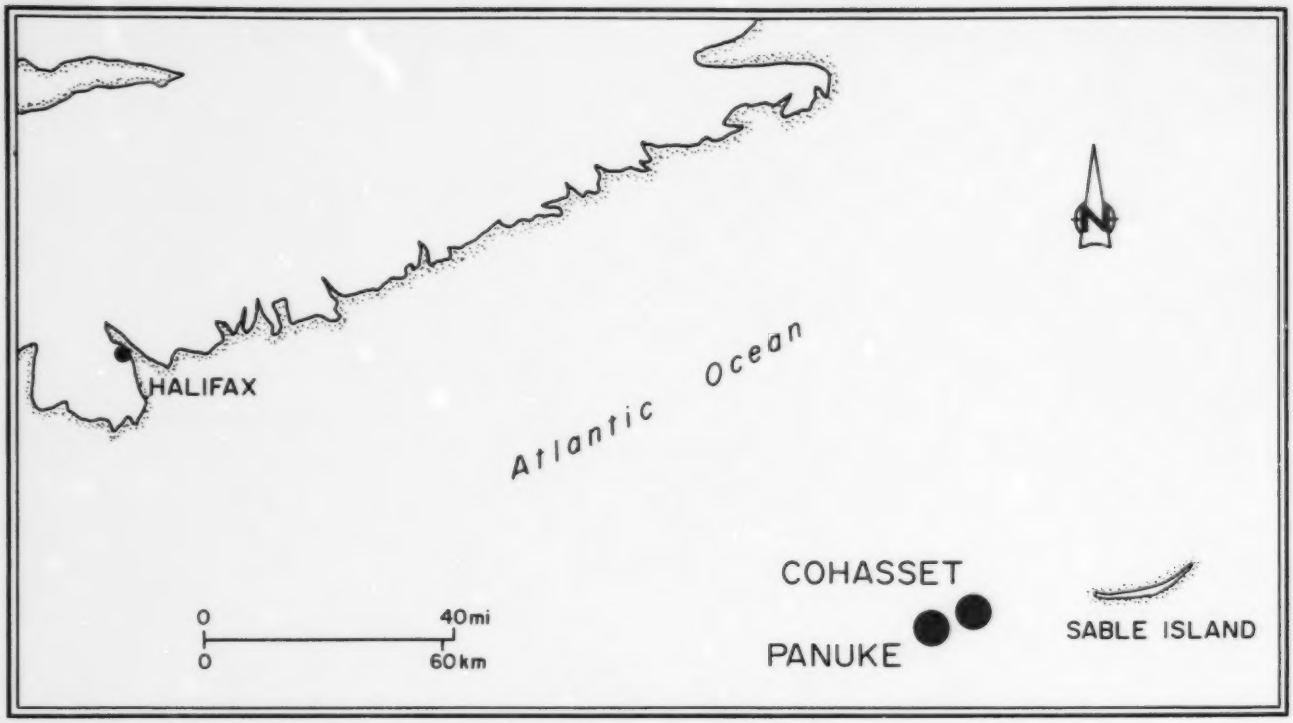


Figure 1 Location of the Cohasset and Panuke oil fields.

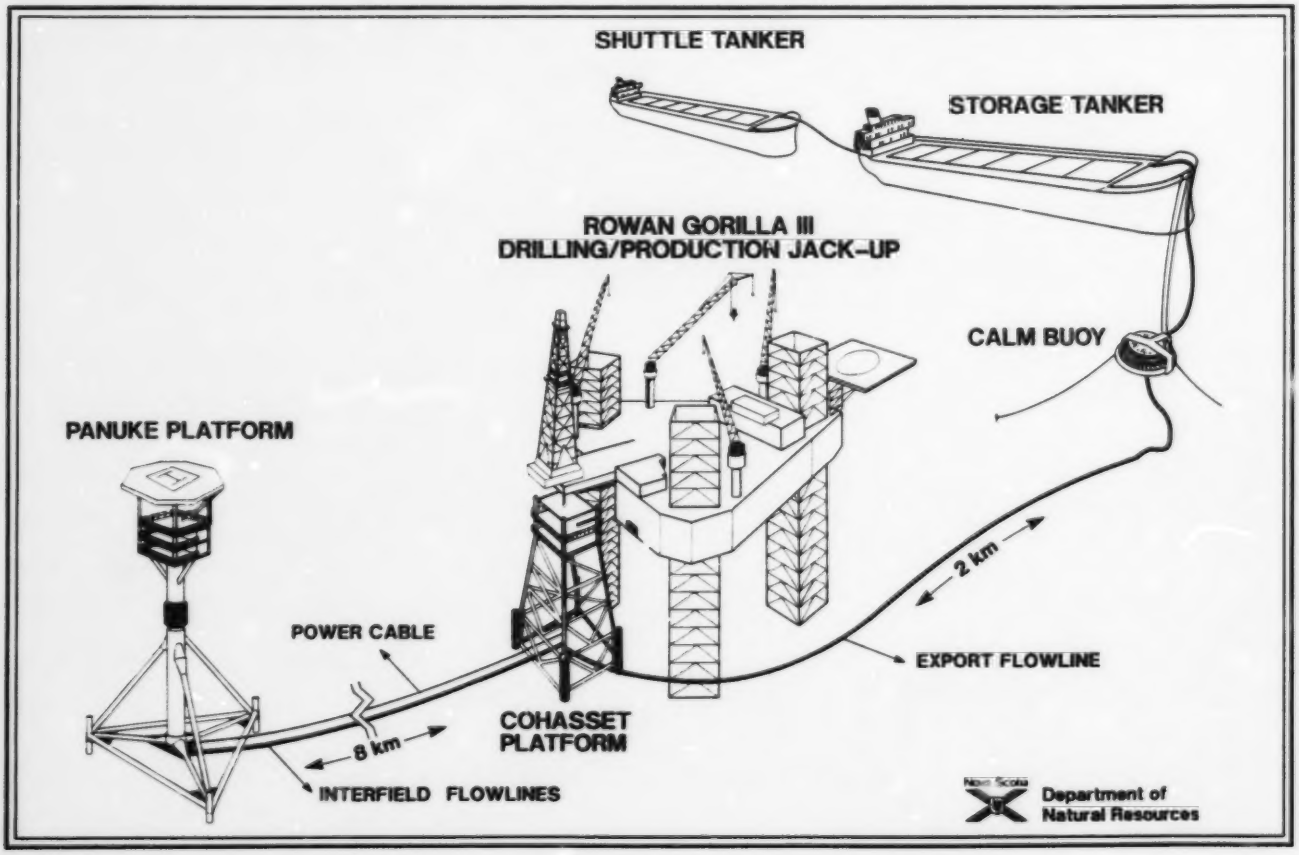


Figure 2 Schematic of Cohasset Project field facilities.

Scotia products and services and through the creation of jobs for Nova Scotians. In addition, Nova Scotia will be paid royalties for each barrel of oil produced and will collect income and sales taxes as a result of the project.

The following tries to explain in everyday words a little about the history, geology, production facilities, economic and employment benefits, and royalties and other revenues associated with the project.

History

Exploration began on the Cohasset field when Mobil Oil Canada, Ltd. drilled a successful discovery well in 1973. Twelve years later, Mobil's partner, Petro-Canada, drilled a successful well to evaluate the field size and again encountered oil. In 1986, Shell Canada Resources Ltd. drilled the Panuke discovery well and the following year a second Panuke well was drilled by Petro-Canada, their partner in the field, to evaluate the size of the field. Light crude from this second well was pumped into a tanker moored beside the exploration rig which drilled the well to demonstrate that the offshore transfer technique was a viable means of producing this type of small oilfield. The oil was then shipped to a Montreal refinery for analysis and refining.

In 1988, Nova Scotia Resources Limited carried out a feasibility study and determined that the combined development of the small Cohasset and Panuke fields would be a commercial proposition. One year later, Nova Scotia Resources Limited teamed up with LASMO plc of London, England, and together they bought out the interests of the original partners in the fields. LASMO Nova Scotia Ltd., a 100% subsidiary of LASMO plc (a British company with extensive North Sea and international petroleum interests), opened offices in Halifax in November, 1989. In early 1990, public hearings related to this development were held around the Province. A Development Plan was approved and permission to begin the project was given in September, 1990. First production is scheduled for June 1992.

Geology

The oil in both fields is contained in a number of sandstone units which are some 120 million years old. These sandstones were deposited as thin, sheet-like layers along an ancient shoreline. The individual layers range in thickness from less than one meter up to 15 meters or more. The sandstone layers are like the layers of bread in a multi-layered, underground sandwich. The layers (more than twelve in the Cohasset field) are porous and, under special conditions, became "charged" with the light gravity oil that is characteristic of both fields. The sandstone layers are separated by thinner layers of shale which are the result of deposits left by the sea as it moved over the beach sand and shoreline deposits.

The area of the Cohasset field is approximately 3 square kilometres and that of the Panuke field, 14 square kilometres. The productive sandstones lie some 2,300 meters below the sea bed.

Production Facilities

General

The schematic drawing (Figure 2) shows the production facilities for the project. In order to describe how they work, the production facilities have been sub-divided below into three groups:

1. Fixed production platforms (towers) at each field connected by seafloor pipelines and power cables;

2. a drilling/production jack-up rig located during the first production season at the Panuke platform and then at the Cohasset platform for the remainder of the project;

3. an export system comprising,

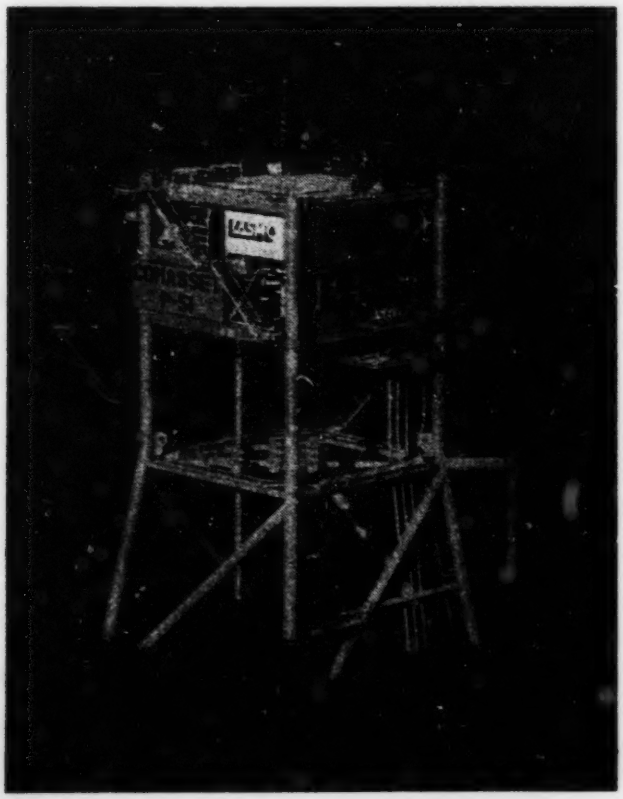
   (a) a mooring/loading buoy system,

   (b) a large storage tanker, and

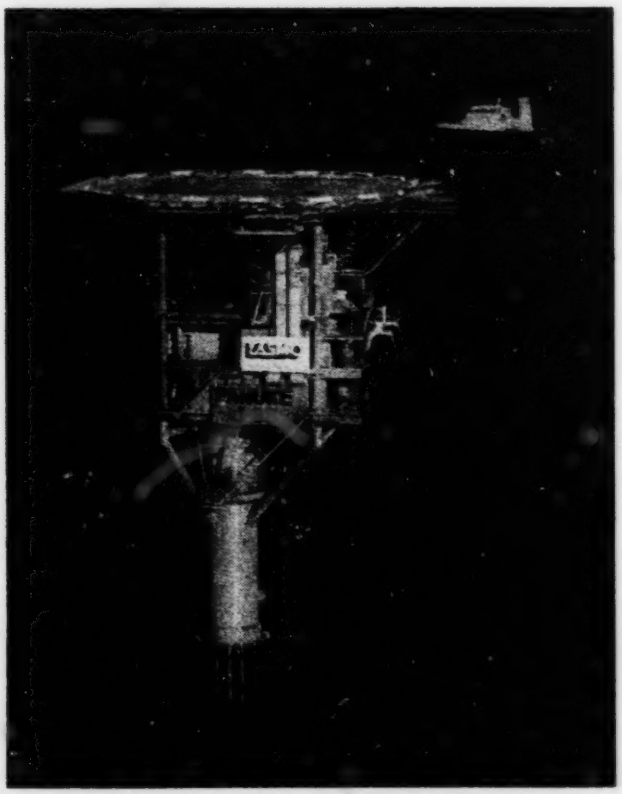
   (c) a shuttle tanker.

Platforms

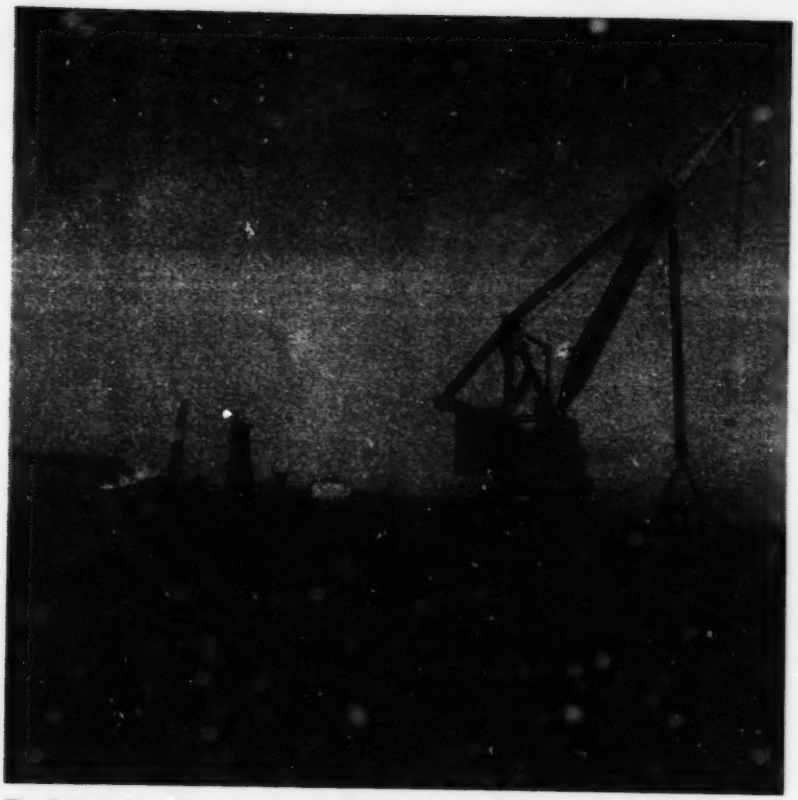
Sitting on the seafloor above the approximate centre of each field is a production platform. The platform is made up of a jacket which is a tubular, steel structure which extends from the seafloor to above sea level and provides support for the platform deck. On the deck are located the valves and other specialized equipment needed to extract oil from the wells below. The Panuke platform also incorporates a helideck for the landing of helicopters. The Panuke platform is larger than the Cohasset platform. This is because



Cohasset P-51 platform on location at the Cohasset field.



Panuke J-99 platform on location at the Panuke field.



The Cohasset jacket being installed over the field by the McDermott Derrick Barge DB-101.

by steel piles which were hammered into the ocean floor.

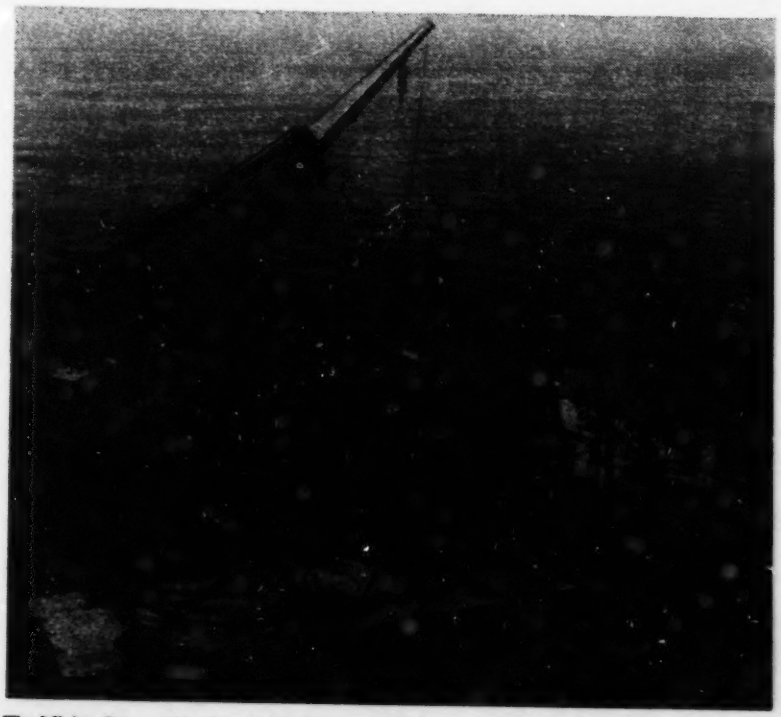
Drilling/Production Jack-Up Rig

The Rowan Gorilla III is an exploration drilling rig which has been especially modified for this project. It is called a "jack-up" rig because its three legs can be jacked up from the sea floor and the floating rig towed to another location. On the Cohasset project the rig has two functions - first to drill the wells which produce the oil and second, to house the equipment which processes the oil.

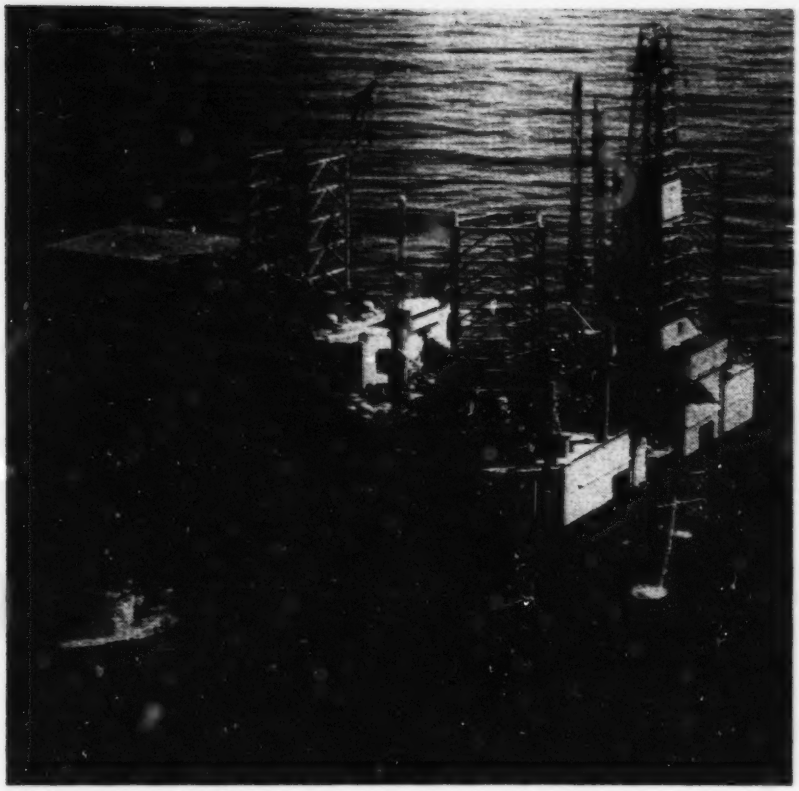
The drilling floor and derrick of the drilling/production jack-up, Rowan Gorilla III, can be moved over the platforms to allow the drilling of the Panuke and the Cohasset production wells which will extract the oil.

the water at the Panuke site is deeper than at the Cohasset site and the Panuke platform has been designed as a remote, stand-alone structure. Much of the heavy equipment needed to extract the oil from the Cohasset field will be located on the Rowan Gorilla III drilling rig, which will sit beside the Cohasset platform. The Cohasset platform therefore doesn't need to be as strong as the Panuke one. The Panuke platform is 80 metres high and weighs about 1,225 tonnes, whereas the Cohasset platform is 70 metres high and weighs about 775 tonnes.

The platform bases and decks were built separately, transported to the offshore fields by barge and lifted into position by a huge floating crane barge from the North Sea which can lift up to 3,000 tonnes. Each platform is secured



The Mighty Servant I beside the McDermott Derrick Barge DB-101 delivering the Panuke and Cohasset jackets to the field sites 40 km southwest of Sable Island.



Rowan Gorilla III drilling the first production well at the Panuke field.

Currently, three production wells have been drilled on the Panuke field and for the first production season (June - November, 1992), the Rowan Gorilla III will remain at this field and produce about 20,000 barrels per day of oil. Keeping the rig at Panuke initially will allow it to drill additional wells on this field if required. The decision as to whether production or water injection wells (explained below) are needed will be determined by evaluating production information as it is collected during the first season of production. Once all the necessary production wells are drilled at Panuke, the rig will be available to move to Cohasset where it will drill six or more production wells and remain on this field for the remainder of the project. When both fields are producing simultaneously, up to 40,000 barrels of oil per day will be produced.

The Rowan Gorilla III also contains the production and processing equipment that will be used to remove the small amount of natural gas and associated water from the oil. As much natural gas as possible will be used in gas turbines to produce electricity for the jack-up operations, while the remainder will be burnt off. The water removed from the oil will be pumped back into the underground reservoirs when needed to pressurize the reservoir to keep the oil flowing. At other times the water will be purified and then discharged into the sea. The Rowan Gorilla III will house the gas turbines and water treatment equipment.

For the first production season, the oil will be produced from the Panuke field only and processed through the adjacent Rowan Gorilla III drilling/production jack-up and be transported 8 kilometres through an 8" diameter seafloor pipeline to the Cohasset platform and through to the storage tanker. After the first production season, the jack-up will be situated beside the Cohasset platform. Additional wells will be drilled, oil will be produced, and the processing of both the Panuke and Cohasset oil will occur at this location.

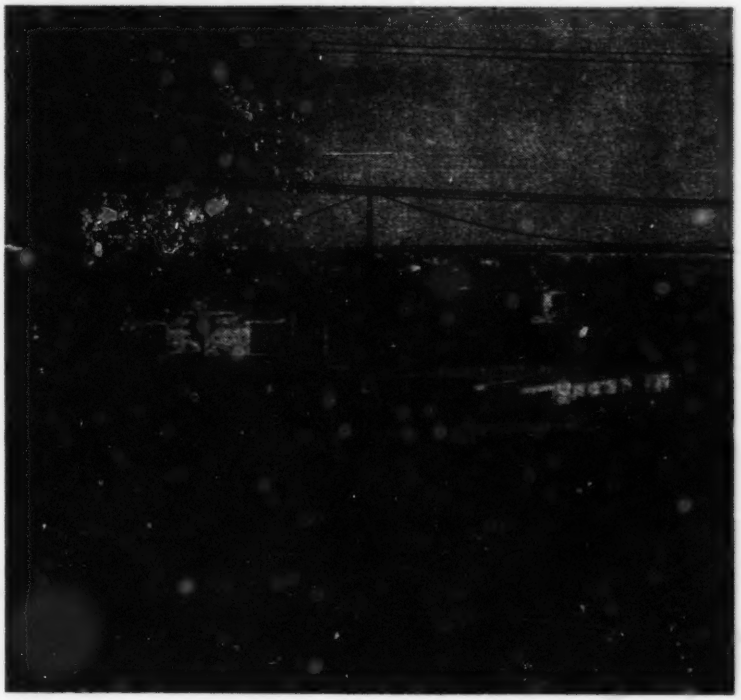
Rowan Gorilla III beside Panuke platform - March 21, 1992

The Rowan Gorilla III drilling/production jack-up will house all people required for the operation of the rig-based production

facilities. All production facilities and processing equipment will be monitored around-the-clock by personnel at the Cohasset site. The Panuke facilities will be operated remotely by electrical and electronic hook-ups from Cohasset.

Export System

Once the natural gas and water have been separated from the oil, the oil will be pumped through a 2.0 kilometre export pipeline on the seafloor to a special floating buoy system (CALM buoy) which is held in place by six anchors. Tied up to the buoy will be a large oil storage tanker, the 127,200 dead weight tonne Nordic Apollo, used to hold the oil as it comes from the drilling production jack-up. Every two weeks or so during the production season, a second tanker, called the "shuttle" tanker, will draw oil from the stern of the storage tanker through a flexible hose. When full, the shuttle tanker will take the load of oil to a refinery ashore. The shuttle tanker is called the Nordic Challenger and can carry 510,000 barrels of oil.



Nordic Apollo storage tanker moored at Pier 9, Halifax Harbour.

The destination of each tanker load of oil will depend upon a number of variables including whether a given refinery is set up to process this quality of crude oil (not all refineries are), as well as the purchase price.

Socio-Economic Benefits for Nova Scotia

General

From Nova Scotia's point of view, one of the tests to determine whether a project has been a success or not is to assess the impact of the project on the economy in terms of direct employment and the expenditure of dollars in the province on goods and services. All petroleum companies exploring for or developing oil and gas offshore Nova Scotia are required to use competitive Nova Scotian goods and services and qualified Nova Scotian employees whenever possible in order to maximize the benefits of the activity to the Province.

Benefits to Nova Scotia Companies

While some highly specialized goods and services were available only from suppliers outside of Canada, a significant number of the contracts for the different components of the project were placed with Nova Scotia companies.

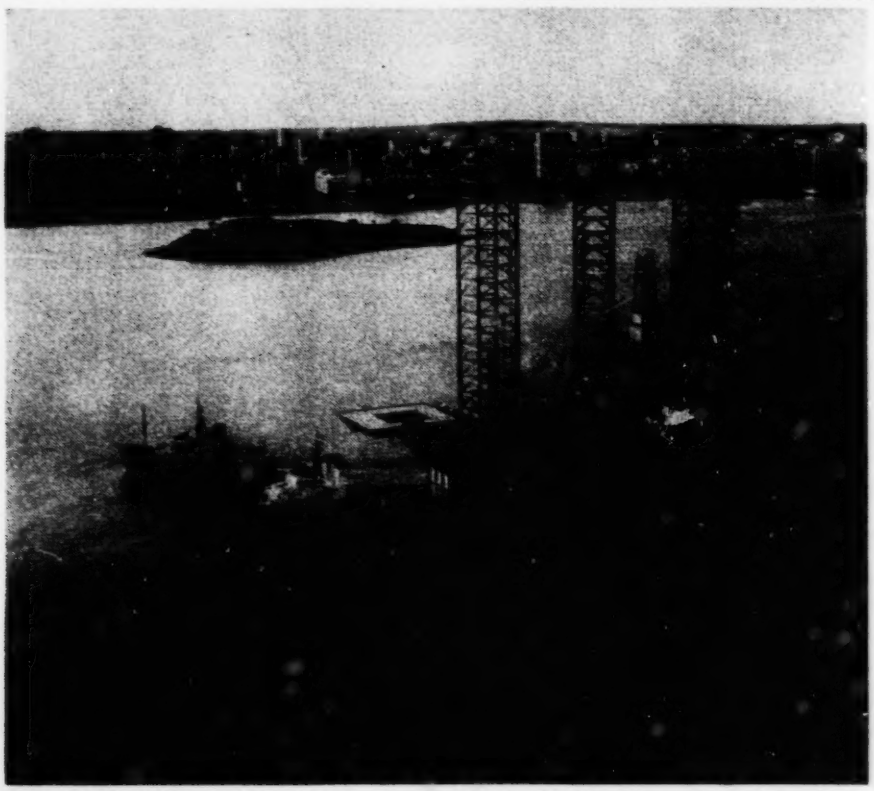
The work resulted in a boost to Nova Scotia's economy at a time when the recession was at its worst.

The Nova Scotian content of the capital costs of the development is calculated to be $116 million, while other Canadian provinces will account for $60 million of the total capital expenditures. During the production phase of the project (1992 to 1997), the Nova Scotia content of direct operating expenditures is estimated to be $217 million and that for other Canadian provinces is calculated at $79 million.

The following examples give an indication of the types of contracts awarded to Nova Scotia firms and the corresponding value of the work:

- Contracts for over $20 million to Catalytic Maritimes of Dartmouth for installation of production equipment on the Rowan Gorilla III and platform completion work.

Panuke J-99 deck at M & M Manufacturing Ltd., Dartmouth.



Rowan Gorilla III departing Halifax Harbour enroute to Panuke field after being outfitted with production equipment in Dartmouth.

- A contract worth $12 million with M & M Manufacturing of Dartmouth for fabrication and outfitting of wellhead platform decks.

- A $4.3 million contract was let to Mulgrave Machine Works of Mulgrave for the manufacture of process skids.

- F & M Steel Products of Sydney made production shelters and electrical room skids worth $2 million.

- Trenton Works Lavelin of Trenton manufactured platform piles and production separators worth over $2 million.

- Other major contracts include one to Secunda Marine of Dartmouth, which received a $40 million contract for supply boats and standby vessels, and another to Cougar Helicopters of Waverley, which received a contract valued at $12 million over four years for helicopter support services.

More than 40 other different contracts have been completed with a Nova Scotia content in excess of one hundred thousand dollars. Sixteen of them have Nova Scotia content of over $1 million each.

Nova Scotia firms have clearly benefitted and will continue to benefit from this offshore project. Direct expenditures in Nova Scotia during the development and operating phases of the project are estimated at more than $330 million. As a result of spin-off benefits from these expenditures, the total impact of the project on the Nova Scotia economy should exceed $500 million.

Employment Opportunities

During the development phase, the project has created important employment opportunities for Nova Scotians and other Canadians. Over 824 person-years of employment have been created during this phase, with Nova Scotians securing 525 person years or approximately 64% of the job opportunities. Other Canadians participated in an additional 198 person years or approximately 24% of generated employment.

Labour requirements for the production phase of the project (1992-1997) are expected to average slightly over 400 person years annually with Nova Scotians assuming approximately 300 person years or 75% of the positions and other Canadians approximately 14%.

Royalties and Other Revenues

In addition to direct and indirect benefits from the project including jobs and incomes for Nova Scotia contractors, other revenues like royalties will flow to the Province.

The basics of the Province's "profit sensitive" offshore royalty regime are that, up to the project payout point (a kind of financial break even point for the project), the Province will receive a royalty of 2% of gross project revenues. After payout point, the royalty will be either 2% of gross revenues or 30% of net revenues (profit), whichever is the greater.

Based on current world oil prices and the producer's estimate of over 49 million barrels of recoverable oil, it is calculated that Nova Scotia will receive royalty revenues of more than $25 million over the six-year life of the project.

Revenues could be considerably higher depending on world oil prices, reserves recovered, exchange rates and other factors. Royalty agreements between the Province and the companies take into account the significant costs involved in discovering and developing the Cohasset and Panuke fields. They also contain provisions for the cost of removing the project facilities at the end of the project to be included as allowed project costs.

Royalties will be payable on the volume of petroleum produced and will be paid to the Province in equal monthly installments, with an adjustment at the end of each six month royalty period.

In addition, revenues from corporate, income and sales taxes will be collected by the Province as a direct result of activities pertaining to the project.

Conclusion

It is evident that Nova Scotia workers and firms are developing the skills, expertise, services, and organization that are necessary to service the offshore petroleum industry during both exploration and development phases. This current project has provided, and will continue to provide, jobs and revenues for Nova Scotians over its six-year life. This first offshore project in Canada is very important to Nova Scotia. It will establish the credibility of the Scotian Shelf as a petroleum production area and will hopefully encourage other offshore exploration and development projects which will benefit Nova Scotians in years to come.

Nova Scotia
Department of
Natural Resources

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